75TH MORSS US Naval Academy, Annapolis, Maryland June 12-13-14 2007 Through Multiple Disciplines, Analytical Power

712CD

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Hyperion Intelligence Dashboards and Experimentation at Lockheed Martin's Center for Innovation (U)

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Hyperion Intelligence Dashboards and Experimentation at Lockheed Martin's Center for Innovation (U)

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Experimentation Data Process

- **Lockheed Martin experimentation at the Center for Innovation**
  - Constructive Simulations
  - Human-in-the-Loop Simulation

- **Two main issues**
  - Data Extraction/Storage
  - Data Manipulation/Reduction

- **Early Experimentation (2006 Processes)**
  - Post Run extraction
  - Manual reduction/consolidation

- **Current Experimentation (2007 Processes)**
  - Real-Time and Post Run extraction
  - Hyperion Intelligence for Data reduction
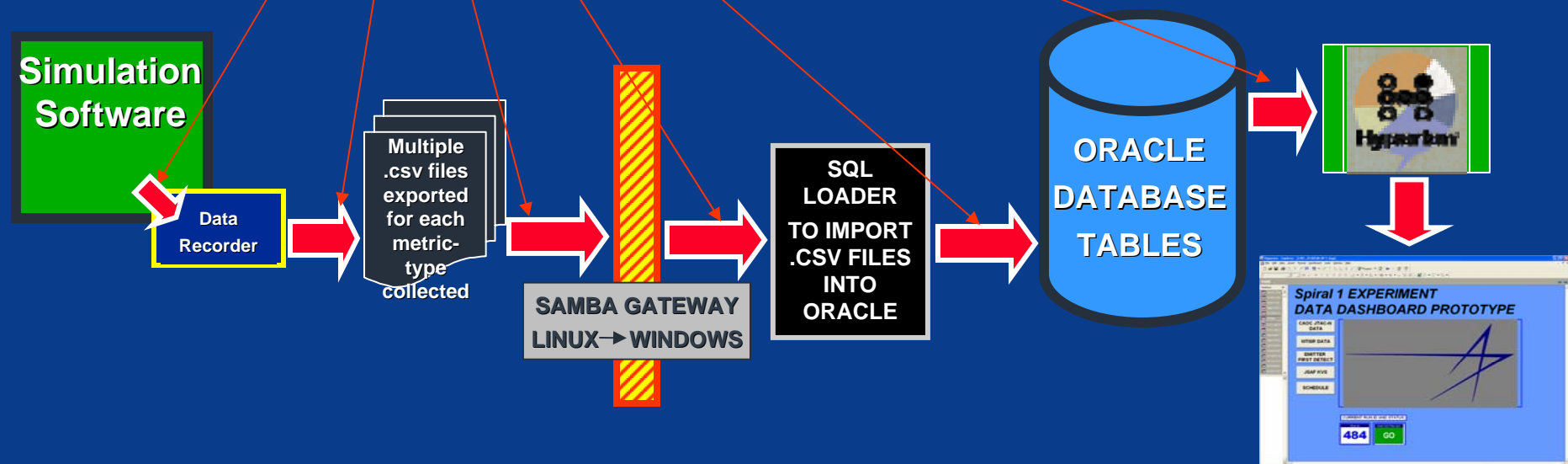
Experimentation in 2006

- **Post experiment runs**
  - Data pulled "as-is" using Hyperion Intelligence and Excel
  - Data stored on PC hard drive

- **Upon completion of all experiment runs**
  - Analyst used manual methods to consolidate datasets
  - Analyst uses Excel and C.O.T.S. statistics packages to analyze data
  - Results consolidated into final experiment report

- **Hyperion Intelligence uses an ODBC connection to the Oracle database**
  - Uses graphical SQL
  - Create Tables, Charts, Graphs
  - Prepare datasets for further analysis
  - Dashboards

Hyperion Intelligence

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Detections by Run

Early Data Extraction

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- **Old Data Extraction Process**
  - Post-Run extraction
  - Extremely Manual and Time-consuming process

Simulation Software

Data Recorder

Multiple .csv files exported for each metric-type collected

SAMBA GATEWAY LINUX → WINDOWS

SQL LOADER TO IMPORT .CSV FILES INTO ORACLE

ORACLE DATABASE TABLES

Hyperion

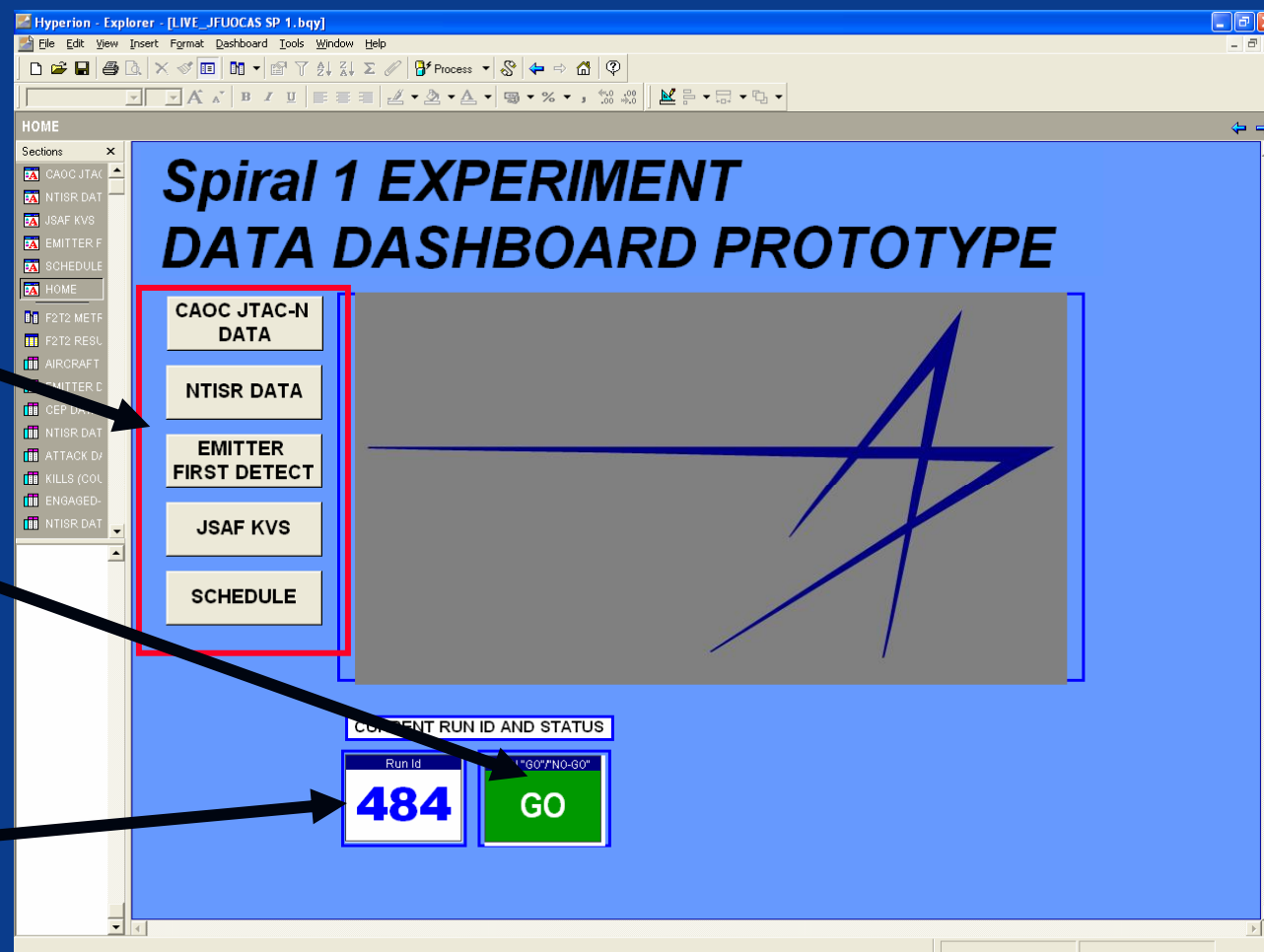**Spiral 1 EXPERIMENT DATA DASHBOARD PROTOTYPE**

484 GO

Manual Dashboards

- Dashboards constructed to allow access to data as experiment runs

Quick-look Report buttons

GO/NO-GO Indicator

Run Number

Experimentation in 2007

- Experiment Data Conference held after Main Planning Conference
  - Database design developed
  - Sample output "analyzed"
- Output Data stored in Oracle Databases
- HLA Oracle Gateway (H.O.G.) developed to provide real-time data from JSAF
- C.O.T.S tool, Hyperion Intelligence, used to manipulate and reduce data
  - Near Real-time data pulls
 - Supplemental Post-experiment processing

HLA Oracle Gateway

- H.O.G. stands for <u>H</u>LA <u>O</u>racle <u>G</u>ateway

  - Subscribes to and records Objects & Interactions defined by the Simulation Object Model (SOM)

  - Records distributed simulation data translated into the SOM format via the Agile FOM Interface

  - Oracle schema defined by the SOM at run time

  - Multi-threaded queuing prevents data loss due to heavy network traffic and bursts in HLA data

  - Optimized Oracle inserts balance large scenarios with real time analysis requirements

    - Binary Data Inserts, Batch Updates, etc.

  - Generic interface allows MySQL or other recording methods
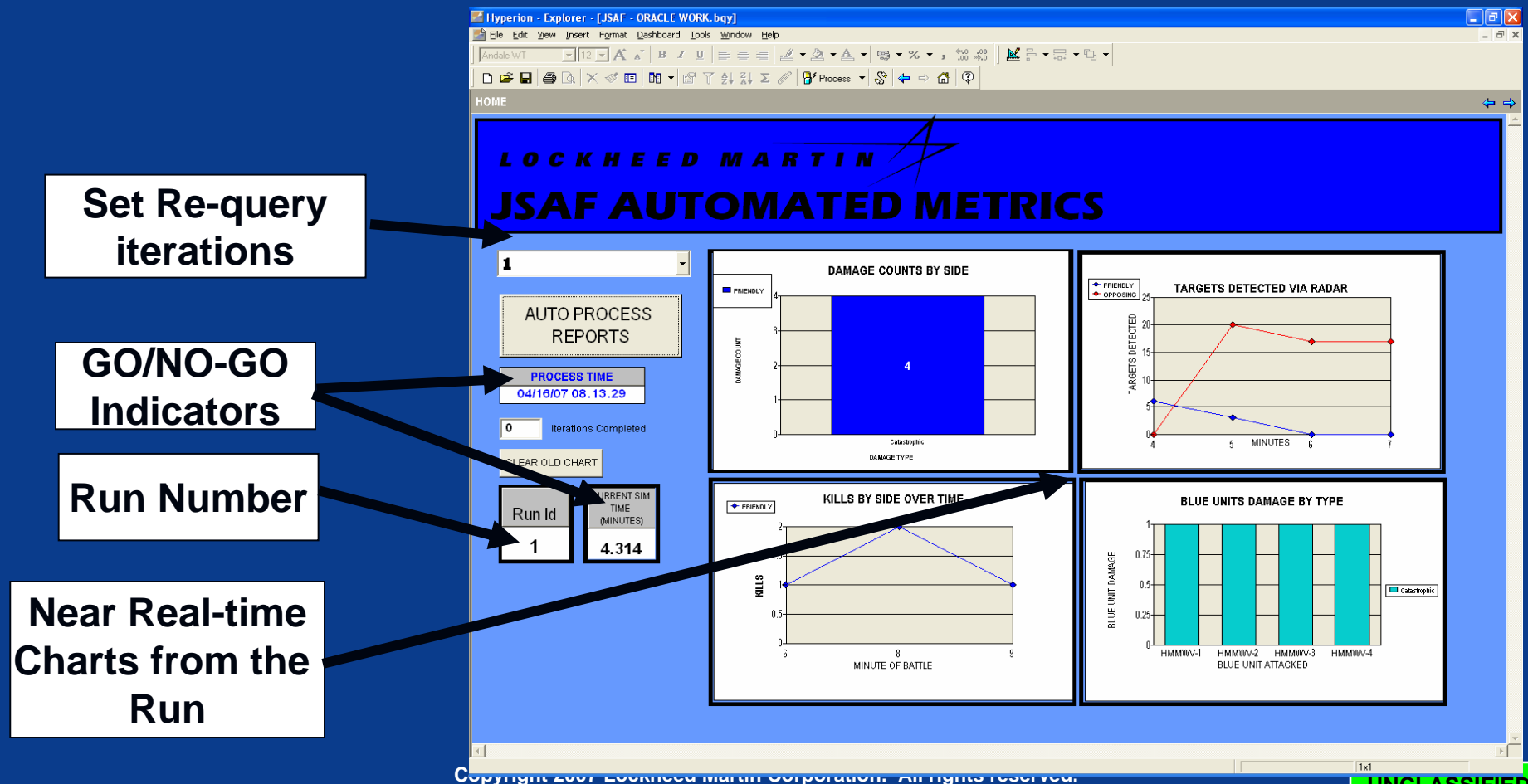
Current Sim Data Accessibility

- **New JSAF Extraction Process**
  - Near Real-time extraction
  - Nearly automated processing and display
  - Hyperion continues to re-query the database to provide updated metrics visually

Automated Dashboards

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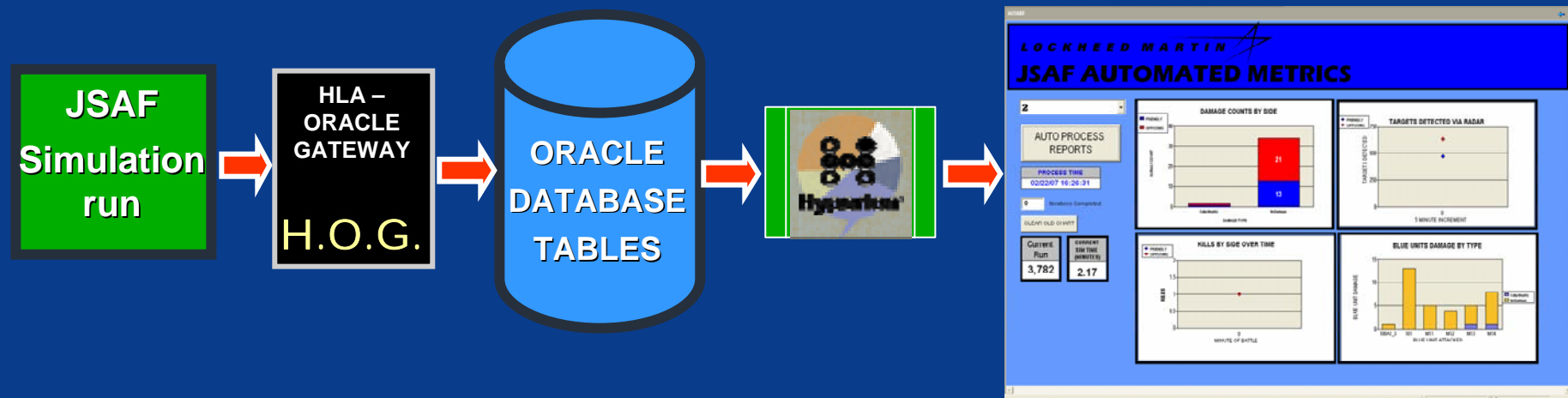
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- Automated Dashboards allow near-real time continually updated access to data as experiment progresses

Set Re-query iterations

GO/NO-GO Indicators

Run Number

Near Real-time Charts from the Run

Flight Simulator Data Accessibility

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- **In addition to JSAF, other simulations can use the same process…**

  - Data extracted real-time into Oracle database

  - Used Hyperion Intelligence Dashboards to consolidate and aggregate aircraft information.

  - Hyperion Intelligence continuously re-queries the database.

  - Dashboards use JavaScript to revolve through a set of tables, charts or graphs and provide near real-time "hands off" updates to status
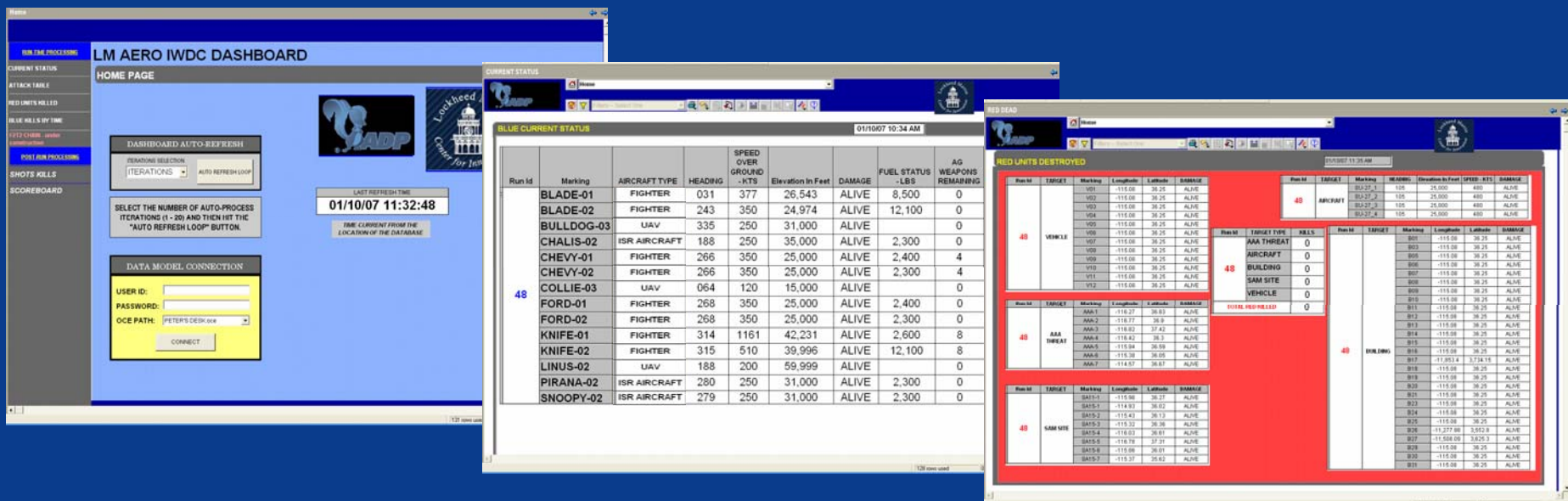
In Conclusion...

Hyperion Intelligence is critical to the success of Operations Analysis at Lockheed Martin's Center for Innovation

- As our simulation and experimentation processes become more detailed, we need to be more agile
  - Number of data elements continues to increase
  - Complexity of data tables continues to increase
  - Analysis of output data becomes more detailed
- Dashboards via Hyperion Intelligence allow flexibility and vision into the experiment:
  - Enables capability to determine experiment accuracy as they are in progress
  - Enables instant extract of result data for quick-turn metrics
  - Enables Observers to "see" the experiment data and "watch" the story unfold

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Questions?